

## PATENT ABSTRACTS OF JAPAN

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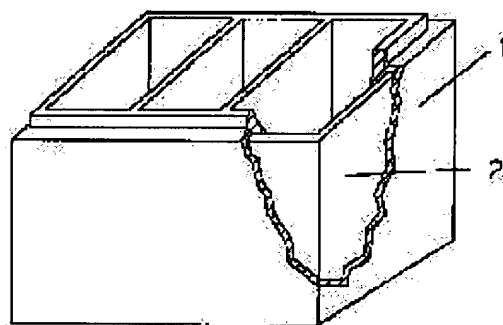
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## (54) SEALED LEAD-ACID BATTERY

## (57)Abstract:

PROBLEM TO BE SOLVED: To restrict the evaporation of moisture from a battery jar, and to improve the strength of the battery jar so as to improve the lifetime characteristic by integrally forming a metal plate with a peripheral wall of a battery jar, which is made of the synthetic resin and which houses an electrode group having a positive electrode, a negative electrode and a separator.

SOLUTION: A peripheral wall of a battery jar 1 made of resin is integrally formed with a metal plate 2, of which four sides are continued so as to be formed into a square, in the condition that the peripheral wall is perfectly covered with the resin. The metal plate 2 prevents the evaporation of moisture in the electrolyte from the resin battery jar 1 into the open air through the resin so as to restrain the concentration of the electrolyte, and while improves the strength of the resin battery jar 1 so as to prevent the generation of deformation or breakdown of the resin battery jar 1 due to the pressure of the electrode group to be generated by increase of the charging current. With this structure, lifetime characteristic is improved in comparison with a resin battery jar, which does not have a metal plate 2.



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**CLAIMS**

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[Claim(s)]

[Claim 1] The sealing form lead accumulator characterized by having really fabricated the metal plate and making it exist in the perimeter wall of said battery case in the sealing form lead accumulator which has the battery case and lid made of synthetic resin which are equipped with the group of electrode which has a positive-electrode plate, a negative-electrode plate, and a separator, and contain said group of electrode.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the battery case of a sealing form lead accumulator.

[0002]

[Description of the Prior Art] Along with development of a computer etc., the need for installation of the uninterruptible power supply (it is called Following UPS) as a backup power supply at the time of the interruption of service is recognized widely, and UPS tends to increase every year. Small, a light weight, and maintenance-free-ization are begun as a cell used for such UPS, and since emphasis is put on dependability including safety, the improvement to them is called for in the sealing form lead accumulator used for this UPS.

[0003] Since especially the sealing form lead accumulator is fabricated by resin and it is placed the upper part of a power circuit, and near the heating element as an installation of UPS as the configuration was shown in drawing 4 consequently, plate degradation by passing the battery case quality of the material, and the moisture in the electrolytic solution evaporating will be promoted, and a battery life will be shortened. Moreover, when using it for a long period of time, it was difficult to hold \*\*\*\*\* uniformly depending on nonconformance with environmental temperature or a battery charger. In a cell with much plate configuration number of sheets, a battery case cannot control the force, but a crack occurs, the dilute sulfuric acid of the electrolytic solution oozes, and damage may be done to a device as an active material expands and the thickness of a plate furthermore increases while in use.

[0004] however, as shown in JP,4-155746,A, form the thermal insulation plate which laminated aluminum etc. in a battery case outer wall, or Although the rod-like structure which becomes a battery case short side face from a metal or high \*\*\*\* resin material was arranged in order to make battery case bulging prevent as holding reinforcement with synthetic resin and making battery case thickness increase was adopted timely and it was shown in JP,3-81951,A It had not resulted in the result to which these both are fully satisfied.

[0005]

[Problem(s) to be Solved by the Invention] For this reason, especially the sealing form lead accumulator used for UPS cannot be influenced of temperature by generating of the heat by the increment in the charging current by nonconformance with an installation or a battery charger arising, and cannot keep \*\*\*\*\* constant in the battery case of synthetic resin that it is easy to produce deformation. Consequently, the life property might deteriorate at an early stage, and might result in breakage of a battery case.

[0006] Since it is furthermore the cell of a maintenance free, when it is used over a long period of time, the moisture in the electrolytic solution passes the battery case quality of the material, it dissipates in atmospheric air, and there is an inclination to promote life degradation further because electrolytic-solution concentration rises, and if influenced of temperature, this degradation will be promoted further.

[0007]

[Means for Solving the Problem] In order to solve this technical problem, in this invention, by really fabricating a metal plate in the perimeter wall of the battery case made of synthetic resin which contains the group of electrode which has a positive-electrode plate, a negative-electrode plate, and a separator, evaporation of the moisture from a battery case is controlled and the reinforcement of a battery case is raised.

[0008]

[Embodiment of the Invention] This invention can be carried out in the sealing form lead accumulator which has the battery case and lid made of synthetic resin which contain the group of electrode which has a positive-

electrode plate, a negative-electrode plate, and a separator like invention concerning claim 1 publication by really fabricating a metal plate and making it exist in the perimeter wall of said battery case.

[0009] And it is rare for the battery case made of synthetic resin to control evaporation of moisture by existence of a metal plate, and to deform, or for a crack to occur, and a life property is good.

[0010] In addition, in order to really fabricate a metal plate in a battery case, in case a battery case is fabricated with metal mold, without providing a special means, it can carry out easily with means, such as embedding a metal plate.

[0011]

[Example] Thermoplastic synthetic resin, such as polypropylene resin and ABS plastics, is used for this invention according to the structure of a battery case shown in drawing 1 that what is necessary is just resin in which injection molding is possible as an ingredient of the resin battery case 1. Although there is especially no limit and iron, aluminum, copper, nickel, etc. can be used as a metal plate 2 the resin of the resin battery case 1, and really fabricated, since the electrolytic solution of a lead accumulator is a dilute sulfuric acid, it must be in the condition completely covered with resin.

[0012] Moreover, although the resin of the resin battery case 1 and the thickness of the metal plate 2 really fabricated can be chosen as arbitration with the configuration of a cell, magnitude, etc., in order to synthetic resin and really fabricate, it is a premise to have the reinforcement about which the metal plate 2 with which the neighborhood of drawing 2 continued can become independent.

[0013] In order to really fabricate, it is good to arrange the metal plate 2 with which the neighborhood continued in the shape of a rectangle into battery case shaping metal mold. Drawing 3 shows the strabism cross-section structure of a metal plate 2 and the shaping metal mold 3. Next, after fastening the shaping metal mold 3, little injection of the resin is carried out from the exit hole 4 where the cross section of the reserve of right and left of a metal plate 2 is small so that rectangle-like the upper part and the lower part of a metal plate 2 may be put, and subsequently previous resin injects a lot of resin from other large exit holes 5 continuously in the condition of not individual-izing completely. In case positioning in the shaping metal mold 3 of the metal plate 2 which continued in the shape of a rectangle is performed in advance, the resin injected next is filled up with the space section 6 of the shaping metal mold 3 and the resin which carried out little injection from the exit hole 4 where the spare cross section is small fabricates the resin battery case 1 whole, it is a positioning process which arranges resin certainly on the front reverse side of a metal plate 2 and which is performed for accumulating. The battery case which arranged the metal plate 2 into the resin battery case 1 can be obtained by fabricating as mentioned above.

[0014] Hereafter, twenty-hour-rating capacity explains the property of this invention using the sealing form lead accumulator of 6.5Ah(s) by nominal-voltage 6V. However, the content volume of a cell was unified in 57 cc / cel, and the cell size was altogether unified by 28mm. The thickness of the outer wall part at the time of the part of a battery case outer wall as shown in drawing 1 as a battery case being the form which put the front flesh side with a thickness of 1.0mm with ABS plastics with a thickness of 0.5mm with the steel plate, and really fabricating used what is set to 2.0mm. As a plate, using the plate in the grid made from a lead-calcium-tin alloy, the plate dimension was 64mm in width of face of 41.5mm, and height, the positive electrode used 3.5mm, the negative electrode used 2.0mm, and, as for 2.0mm and a glass fiber separator, thickness constituted the group of electrode from three positive electrodes and four negative electrodes. After inserting a group of electrode into each cel, connection between cels was made with the conventional method, and the adhesion unification of a battery case and the inside lid was carried out using thermosetting resin.

[0015] Next, after pouring in 15 cc of dilute sulfuric acids of specific gravity 1.235 and attaching a cap-like relief valve from the relief valve prepared in the inside lid, the top cover was carried on the relief valve, it combined with the inside lid, and joining was carried out with the supersonic wave. Charge was performed on this cell in 600mA constant current for 20 hours, and the cell was created.

[0016] The battery case outer wall constituted the cell using the battery case created as became the same as that of 2.0mm similarly, using a steel plate (0.8mm, 0.5mm, and 0.3mm) as a comparison. It fabricated only by the conventional resin which furthermore does not use a metal plate, and the cell by which a battery case outer wall is set to 2.0mm was also set and created.

[0017] Five kinds each of above six cells were created respectively, and it charged continuously in the constant voltage of 6.9V under the 60-degree C environment. In order to evaluate a battery case crack accelerative at this

time, slitting with a depth of 0.3mm was put into the cell front face in the longitudinal direction. this cell -- ambient temperature discharged until the electrical potential difference fell to 5.25V according to the constant current of 1.6A every three weeks at 25 degrees C, and it measured that discharge persistence time. Time amount from which this discharge persistence time will be in 50% of an initial state was made into the life of that cell. Moreover, the thickness of the direction of a short side face of these cells was compared with the early condition.

[0018] The above result was shown in Table 1. The battery case crack was generated only in the conventional resin battery case, although it did not generate by the cell which unified the steel plate. Moreover, in 60-degree-C trickle life test result, the larger one of the thickness of a metal plate is good, and it was being reflected in the result that the welding pressure to a group of electrode was able to be held. However, it has resulted in the life in the conventional example in 4.5 months.

[0019] Furthermore, the moisture transparency to the exterior is controlled by existence of a metal plate, there is also little reduction of cell weight, and it can be surmised to a plate that the life property was good, without electrolytic-solution concentration increasing.

[0020] In addition, although explained using the steel plate, even if it uses other metal plates, it can have the same effectiveness here.

[0021]

[Table 1]

	本発明				従来
金属板の厚さ (mm)	1.0	0.8	0.5	0.3	未使用
電槽の膨らみ (mm)	0.8	1.0	1.2	1.8	3.8
電槽の割れ発生数 (個)	0	0	0	0	2
60℃トリクル寿命 (月)	6.5	5.8	5.8	5.5	4.5
電池重量の減少 (g)	5.8	6.2	6.2	5.8	12.3

[0022]

[Effect of the Invention] As explained in full detail above, when the battery case uses that by which a metal plate and resin were really fabricated with the configuration which inserts a metal plate into a battery case outer wall according to the configuration of this invention, battery case deformation or generating of a crack can be prevented, and the sealing form lead accumulator which has improved the life property can be obtained.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The important section notching perspective view of the battery case of the cell used for the example of this invention

[Drawing 2] The perspective view of the metal plate with which this neighborhood continued

[Drawing 3] The cross-section perspective view of this metal plate and shaping metal mold

[Drawing 4] The important section notching perspective view of the battery case of the conventional cell

[Description of Notations]

1 Resin Battery Case

2 Metal Plate

3 Shaping Metal Mold

4 Small Exit Hole

5 Large Exit Hole

6 Space Section

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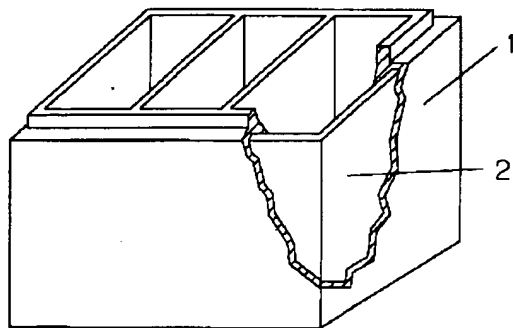
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DRAWINGS

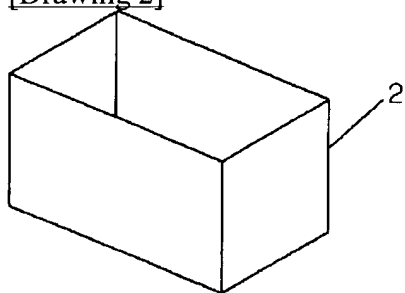
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[Drawing 1]

- 1 樹脂電箱  
2 金属板



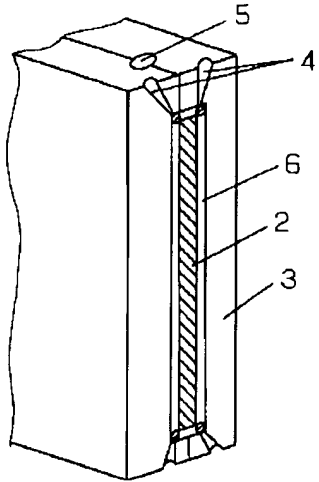
[Drawing 2]



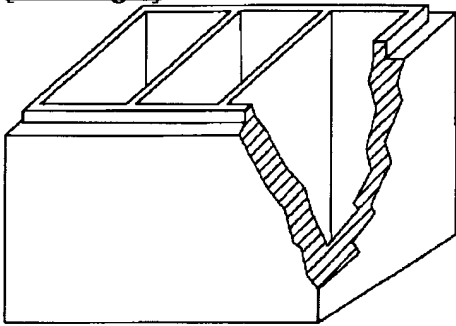
[Drawing 3]



- 3 成形金型
- 4 小さい射出口
- 5 大きい射出口
- 6 空間部



[Drawing 4]



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[Translation done.]

PAT-NO: JP410106513A

DOCUMENT-IDENTIFIER: JP 10106513 A

TITLE: SEALED LEAD-ACID BATTERY

PUBN-DATE: April 24, 1998

INVENTOR-INFORMATION:

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KUREMATSU, MICHIO

ASSIGNEE-INFORMATION:

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COUNTRY

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N/A

APPL-NO: JP08260394

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ABSTRACT:

PROBLEM TO BE SOLVED: To restrict the evaporation of moisture from a battery jar, and to improve the strength of the battery jar so as to improve the lifetime characteristic by integrally forming a metal plate with a peripheral wall of a battery jar, which is made of the synthetic resin and which houses an electrode group having a positive electrode, a negative electrode and a separator.

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resin so as to restrain the concentration of the electrolyte, and while improves the strength of the resin battery jar 1 so as to prevent the generation of deformation or breakdown of the resin battery jar 1 due to the pressure of the electrode group to be generated by increase of the charging current. With this structure, lifetime characteristic is improved in comparison with a resin battery jar, which does not have a metal plate 2.

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(54) 【発明の名称】 密閉形鉛蓄電池

(57) 【要約】

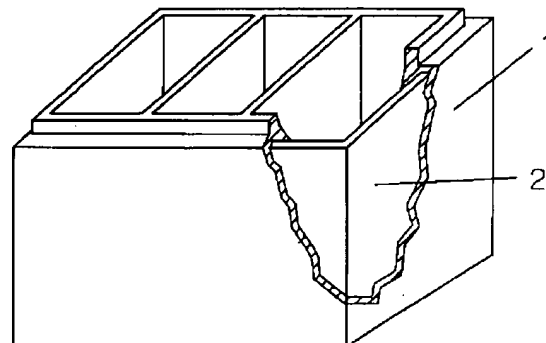
【課題】 寿命特性を向上させるため強度が高く、水分透過を抑制する電槽を有する密閉形鉛蓄電池を供給する。

【解決手段】 正極板、負極板およびセパレータから構成された極板群を備え、この極板群を収納する樹脂製の電槽および中蓋、上蓋から構成された密閉形鉛蓄電池であって、樹脂電槽1の外周に金属板2を合成樹脂中に一体化する構造により、電槽強度を向上させるとともに水分の透過蒸発を抑制する。

1 樹脂電槽

2 金属板

resin  
metal plate



## 【特許請求の範囲】

【請求項1】 正極板、負極板およびセパレータを有する極板群を備え、前記極板群を収納する合成樹脂製の電槽および蓋体を有する密閉形鉛蓄電池において、前記電槽の周囲壁中に金属板を一体成形して存在させたことを特徴とする密閉形鉛蓄電池。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、密閉形鉛蓄電池の電槽に関するものである。

【0002】

【従来の技術】コンピュータ等の発達につれ、その停電時のバックアップ電源としての無停電電源装置（以下UPSと言う）の設置の必要性が広く認識され、UPSは年々増加する傾向にある。このようなUPSに用いる電池としては小形、軽量、メンテナンスフリー化をはじめ、安全性を含めた信頼性に重点が置かれているために、このUPSに用いる密閉形鉛蓄電池において、それらに対する改善が求められている。

【0003】特に密閉形鉛蓄電池は図4にその構成を示したように、樹脂で成形されているため、UPSの設置場所として電源回路の上部や発熱体の近くに置かれることもあり、その結果、電槽材質を通過して電解液中の水分が蒸発することによる極板劣化が促進され電池寿命は短縮されてしまう。また、長期間使用する場合、環境温度や充電器との不適合によっては極板群圧を一定に保持することが困難であった。さらに使用中に活物質が膨張し極板の厚みが増加するにつれ、極板構成枚数の多い電池においては、電槽がその力を抑制できず割れが発生し、電解液の希硫酸がにじみ出てきて機器に損傷を与えることがある。

【0004】しかし、特開平4-155746号公報に示すように、アルミニウム等をラミネートした遮熱板を電槽外壁に設けたり、合成樹脂で強度を保持したりして電槽肉厚を増加させることは適時採用されていて、また、特開平3-81951号公報に示すように、電槽膨れを防止させるために電槽短側面に金属または高鋼性樹脂材よりなる棒状体を配置させたりしていたが、この両者を十分に満足させる結果には至っていなかった。

【0005】

【発明が解決しようとする課題】このためUPSに用いる密閉形鉛蓄電池は、特に設置場所や充電器との不適合が生じることで充電電流の増加による熱の発生で温度の影響を受け、合成樹脂の電槽では変形を生じやすく極板群圧を一定に保つことができない。その結果、寿命特性が早期に劣化したり、電槽の破損に至ることもあった。

【0006】さらにメンテナンスフリーの電池であるから長期にわたり使用すると電解液中の水分が電槽材質を通過し大気中に散逸してしまい、電解液濃度が上昇することで寿命劣化をさらに促進させる傾向があり、温度の

影響を受けるとさらにこの劣化が促進される。

【0007】

【課題を解決するための手段】この課題を解決するために本発明では、正極板、負極板およびセパレータを有する極板群を収納する合成樹脂製の電槽の周囲壁に金属板を一体成形することにより電槽からの水分の蒸発を抑制し、電槽の強度を向上させている。

【0008】

【発明の実施の形態】本発明は、請求項1記載に係る発明のように、正極板、負極板およびセパレータを有する極板群を収納する合成樹脂製の電槽および蓋体を有する密閉形鉛蓄電池において、前記電槽の周囲壁中に金属板を一体成形して存在させることにより実施することができる。

【0009】そして金属板の存在により合成樹脂製の電槽は水分の蒸発を抑制し変形したり割れが発生することが少なく、寿命特性の良いものである。

【0010】なお、金属板を電槽中に一体成形するには、特別の手段を講じることなく電槽を金型で成形する際に金属板を埋め込む等の手段により容易に実施することができる。

【0011】

【実施例】本発明は、図1に示した電槽の構造により樹脂電槽1の材料としては、射出成形が可能な樹脂であれば良く、ポリプロピレン樹脂やABS樹脂等の熱可塑性合成樹脂を用いる。樹脂電槽1の樹脂と一体成形される金属板2としては、特に制限はなく、鉄、アルミニウム、銅、ニッケル等を使用することができるが、鉛蓄電池の電解液が希硫酸であるため樹脂で完全に被覆された状態でなければならない。

【0012】また、樹脂電槽1の樹脂と一体成形される金属板2の厚さは電池の形状、大きさ等により任意に選択できるが、合成樹脂と一体成形するために図2の四辺が連続した金属板2が自立できる強度を有することが前提である。

【0013】一体成形するためには電槽成形金型の中に四辺が方形に連続した金属板2を配置すると良い。図3は金属板2と成形金型3の斜視断面構造を示す。次に成形金型3を締めた後に方形の金属板2の上部と下部を挟み込むように金属板2の左右の予備の断面積の小さい射出口4から樹脂を少量射出させ、次いで先の樹脂が完全に個化しない状態において連続して他の大きい射出口5から大量の樹脂を射出する。予備の断面積の小さい射出口4から少量射出した樹脂は方形に連続した金属板2の成形金型3内の位置決めを事前に行うもので、次に射出される樹脂が成形金型3の空間部6を充填して、樹脂電槽1全体を成形する際に金属板2の表裏に確実に樹脂を配置させるために行う位置決め工程である。上記のように成形することで金属板2を樹脂電槽1中に配した電槽を得ることができる。

【0014】以下、公称電圧6Vで20時間率容量が6.5Ahの密閉形鉛蓄電池を用いて本発明の特性を説明する。ただし、電池の内容積は全て57cc/セルでセル幅は28mmで統一させた。電槽として図1に示されたような電槽外壁の部分は鋼板で厚さ1.0mmの表裏を、厚さ0.5mmのABS樹脂で挟み込んだ形で、一体成形した際の外壁部分の厚みは2.0mmになるものを用いた。極板としては鉛-カルシウム-錫合金製の格子による極板を用い、極板寸法は幅41.5mm、高さ64mmで、厚みは正極が3.5mm、負極が2.0mm、ガラス繊維セパレータは2.0mmを用い、正極3枚、負極4枚で極板群を構成した。各々のセル内に極板群を挿入した後、常法によりセル間接続を行い、電槽と中蓋を熱硬化性樹脂を用いて接着一体化した。

【0015】次に中蓋に設けられた安全弁から、比重1.235の希硫酸を15cc注入し、キャップ状の安全弁を取り付けた後、安全弁の上に上蓋を載せ中蓋に組み合わせ超音波により溶着させた。この電池に600mAの定電流にて20時間充電を行い、電池を作成した。

【0016】比較として0.8mm、0.5mm、0.3mmの鋼板を用いて、同様に電槽外壁は2.0mmと同一になるようにして作成した電槽を用いて電池を構成した。さらに金属板を使用しない従来の樹脂のみで成形して、電槽外壁が2.0mmとなる電池もあわせて作成した。

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	本発明				従来
金属板の厚さ (mm)	1.0	0.8	0.5	0.3	未使用
電槽の隙らみ (mm)	0.8	1.0	1.2	1.8	3.8
電槽の割れ発生数 (個)	0	0	0	0	2
60℃トリクル寿命 (月)	6.5	5.8	5.8	5.5	4.5
電池重量の減少 (g)	5.8	6.2	6.2	5.8	12.3

【0022】

【発明の効果】以上詳述したように本発明の構成によれば、電槽外壁に金属板を挟む構成でその電槽が金属板と樹脂が一体成形されたものを用いることにより、電槽変形あるいは割れの発生を防止でき、寿命特性を改善した密閉形鉛蓄電池を得ることができる。

【図面の簡単な説明】

【図1】本発明の実施例に用いた電池の電槽の要部切欠斜視図

【図2】同四辺が連続した金属板の斜視図

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\*【0017】以上の各5種類の電池を各々6個作成して、60℃の環境下において6.9Vの定電圧にて連続的に充電を行った。この時に電槽割れを加速的に評価するため、電池表面に深さ0.3mmの切り込みを横方向に入れた。この電池を雰囲気温度は25℃で3週間毎に1.6Aの定電流で5.25Vまで電圧が低下するまで放電し、その放電持続時間を測定した。この放電持続時間が初期状態の50%になる時間をその電池の寿命とした。またこれらの電池の短側面方向の厚さを初期の状態と比較した。

【0018】以上の結果を表1に示した。電槽割れは鋼板を一体化した電池では発生しなかったが、従来の樹脂電槽のみでは発生した。また、60℃トリクル寿命試験結果では金属板の厚みは大きい方が良好であり、極板群への加圧力を保持できていたのが結果に反映していた。しかし従来例では4.5ヵ月で寿命に至っている。

【0019】さらに、金属板の存在により外部への水分透過が抑制され電池重量の減少も少なく、電解液濃度が増加することなく極板に対して寿命特性が良好であったと推測できる。

【0020】なお、ここでは鋼板を用いて説明したが他の金属板を用いても同様な効果を有することができる。

【0021】

【表1】

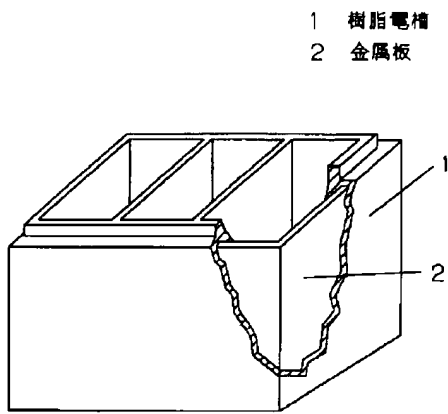
※【図3】同金属板と成形金型との断面斜視図

【図4】従来の電池の電槽の要部切欠斜視図

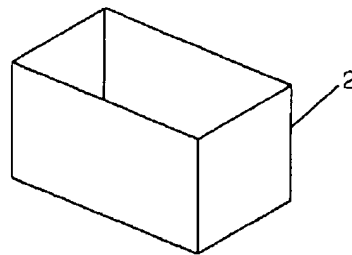
【符号の説明】

- 1 樹脂電槽
- 2 金属板
- 3 成形金型
- 4 小さい射出口
- 5 大きい射出口
- 6 空間部

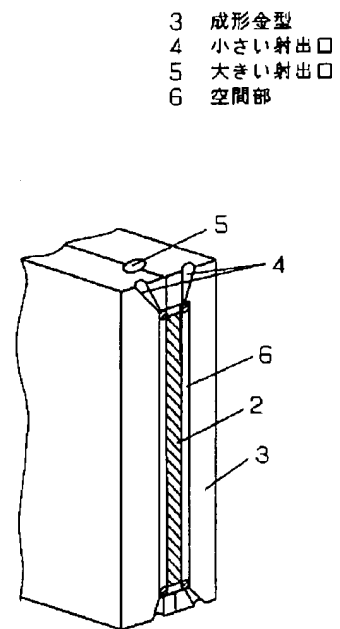
【図1】



【図2】



【図3】



【図4】

